coil 26.2 is fully penetrated by the ferromagnetic material of the sensor part 17, and the short-circuit ring 23.0 therefore lies outside the area of influence of coil 26.2.

According to Figure 5b), the short-circuit ring 23 is effectively almost completely enclosed by the coil 18.1 in the final position I while the passive coil 26.1 is partially penetrated by the adjacent ferromagnetic material of the sensor part 17 and the passive coil 26.2 is completely penetrated.

If the sensor part 17 is displaced into the final position II shown in Figure 5c), the final edge 23.3 of the short-circuit ring 23.0 reaches the region in which it is overlapped by the coil 26.1 while the short-circuit ring 23 overlaps the area of influence of the coil 26.2. The coil 18.1 is effectively almost completely penetrated by the ferromagnetic material of the sensor part 17 in this position.

Figure 7 shows a diagram in which the voltage V is plotted as a function of the length of stroke h. This figure also shows the resulting measurement errors of different systems in relation to the actual displacement.

The line V shows the voltage for a stroke of 8 mm. The broken line 1R indicates the absolute measurement error for the embodiment according to Figure 2 with only one short-circuit ring, in millimeters, while the continuous line 2R indicates the error deviation for an embodiment according to Figure 5 with two short-circuit rings, a long active coil 18.1 and two short passive coils 26.1 and 26.2. According to this diagram, the embodiment according to Figure 5 results in a significantly improved linearity of the measuring signal.

Claims

1. A sensor assembly for detecting travel of a movable member, particularly a positioning element that is moved by an actuator, wherein said sensor assembly features a stationary coil arrangement (18) with an active coil (18.1) and at least one passive coil (26.1, 26.1) arranged at a distance therefrom, wherein said coil arrangement is connected to a power supply unit (30) and a signal acquisition device (29), wherein the sensor assembly also features an axially movable rod-shaped sensor part (17) that is preferably manufactured from a magnetizable material and is connected to the positioning element that can be moved axially back and forth, wherein said rod-shaped sensor part is provided with at least one short-circuit element (23, 23.0) that is manufactured from an electrically conductive material with a low ohmic resistance and is respectively delimited by a final edge (23.1, 23.2) in the longitudinal direction, and wherein said short-circuit element has a dimension relative to the direction such of movement that one final edge (23.1, 23.2, 23.3) of the at least one short-circuit element (23) is enclosed by the active coil (18.1) and another final edge (23.1, 23.2, 23.3) of the at least one short-circuit element (23, 23.0) is

at least partially encompassed by one of the at least one passive coils (26.1, 26.2) in at least one of the final positions (I, II) defined by the given length of stroke (h).

2. The sensor assembly according to Claim 1, characterized by the fact that two short-circuit elements (23, 23.0) that are respectively delimited by final edges (23.1, 23.2) are arranged on the rod-shaped sensor part (17) such that they are spaced apart from one another, and by the fact that the distance between the facing ends of the at least two coils (18.1, 26.1) as well as the distance between the facing final edges (23.1, 23.2) of the short-circuit elements (23, 23.0) are chosen such that one of the final edges (23.1, 23.2, 23.3) of the short-circuit element (23, 23.0) is enclosed by the active coil (18.1) and another final edge (23.1, 23.2) of one of the two short-circuit elements (23, 23.0) is at least partially encompassed by one of the at least one passive coils (26.1, 26.2) in at least one of the final positions (I, II) defined by the given length of stroke (h).

3. The sensor assembly according to Claim 1, characterized by the fact that the active coil (18.1) has a greater length relative to the direction of movement of the sensor part (17) than the at least one passive coil (26.1, 26.2) arranged at a distance from the active coil (18.1).

4. The sensor assembly according to one of Claims 1-3, characterized by the fact that, in an arrangement in which one passive coil (26.1, 26.2) is respectively arranged at each end of the active coil (18.1) and two short-circuit elements (23, 23.0) are provided, the distance between the facing final edges (23.1, 23.2) of the short-circuit elements (23, 23.0) as well as the length of both short-circuit sections (23, 23.0) are chosen such that one final edge of one of the short-circuit elements (23, 23.0) is enclosed by the active coil (18.1) and another final edge (23.1, 23.2) of one of the two short-circuit elements (23, 23.0) is at least partially encompassed by one of the passive coils (26.1, 26.2) in each of the final positions (I, II) defined by the given length of stroke (h).

5. The sensor assembly according to Figure 4, characterized by the fact that the two passive coils (26.1, 26.2) are electrically connected in series and together form one-quarter of a carrier frequency bridge (29).

6. The sensor assembly according to one of Claims 1-5, characterized by the fact that at least the active coil (18.1) is purposefully wound irregularly.

7. The sensor assembly according to one of Claims 1-6, characterized by the fact that the length of at least the short-circuit element (23) associated with the active coil (18.1) is greater than the length of the active coil (18.1).

8. The sensor assembly according to one of Claims 1-7, characterized by the fact that the length of the active coil (18.1) is greater than the length of stroke (h) to be measured.

9. The sensor assembly according to one of Claims 1-8, characterized by the fact that the inductance of the active coil (18.1) approximately corresponds to the sum of those of the passive coils (26.1, 26.2).

10. The sensor assembly according to one of Claims 1-10, characterized by the fact that the wall thickness of the short-circuit element (23, 23.0) is chosen such that temperature influences on the sensor assembly are largely compensated.

11. The sensor assembly according to one of Claims 1-7, characterized by the fact that the active coil (18.1) and the at least one passive coil (26.1, 26.2) are interconnected such that a half bridge is formed, and are associated with the area of influence of the sensor part (17) such that they fulfill the function of an active coil in at least one of the final positions (I, II) defining the length of stroke (h).

12. The sensor assembly according to one of Claims 1-10, characterized by the fact that a carrier frequency measuring bridge (29) is provided for the power supply and the signal acquisition, wherein the active coil (18.1) and the passive coils (26.1, 26.2) of the coil arrangement (18) form part of the measuring bridge (29).